

**WHAT IS CLAIMED IS:**

1. A telemetry apparatus comprising:

a monolithic substrate;

data acquisition means carried on said substrate for acquiring data;

a transmitter carried on said substrate and in operable connection with said data

acquisition means;

controller means carried on said substrate and in operable connection with said

transmitter for selectively enabling said transmitter at selected times; and

a clock generator carried on said substrate operably connected to said data acquisition

means and said transmitter and said means.

2. The apparatus as recited in claim 1, wherein said clock generator is connected to a single oscillation source.

3. The apparatus as recited in claim 1, wherein said clock generator transmits a first frequency to said data acquisition means, transmits a second frequency to said transmitter, and transmits a third frequency to said controller means wherein said first, second, and third frequencies are rational multiples of a selected frequency.

4. The apparatus as recited in claim 3, further consisting of a single oscillation source for providing the selected frequency.

5. The apparatus as recited in claim 1, further comprising sensor means in electrical communication with said data acquisition means for detecting ambient attributes in proximity to said monolithic substrate.

6. The apparatus as recited in claim 5, wherein said sensor means is selected from the group consisting of a temperature sensor, an optical sensor, a flow sensor, a humidity sensor, a chemical sensor, a biochemical sensor, a current sensor, a voltage sensor, a magnetic field sensor, an electric field sensor, a force sensor, an acceleration sensor, a velocity sensor, a displacement sensor, a position sensor, a vibration sensor, an acoustic sensor, a radiation sensor, a charge sensor, a viscosity sensor, a density sensor, an electrical resistance sensor, an electrical impedance sensor, an electrical capacitance sensor, an electrical inductance sensor and a pressure sensor.

7. The apparatus as recited in claim 1, further comprising data processing means carried on said substrate operably connected between said data acquisition means and said transmitter for processing said data.

8. The apparatus as recited in claim 1, wherein said controller means selectively enables said data acquisition means at selected times.

9. The apparatus as recited in claim 8, wherein said controller means sequentially enables said data acquisition means and said transmitter.

10. The apparatus as recited in claim 8, further comprising programming means for programming the times that said controller enables said data acquisition means.

11. The apparatus as recited in claim 1, further comprising programming means for programming the times that said controller enables said transmitter.

12. The apparatus as recited in claim 11, wherein said programming means programs said controller using an optical bitstream.

13. The apparatus as recited in claim 11, wherein said programming means programs

said controller using RF communications.

14. The apparatus as recited in claim 8, further comprising programming means for programming the times that said controller enables said data acquisition means.

15. The apparatus as recited in claim 14, wherein said programming means programs said controller using an optical bitstream.

16. The apparatus as recited in claim 11, wherein said programming means programs said controller using RF communications.

17. A telemetry apparatus comprising:

a monolithic substrate;

data acquisition means carried on said substrate for acquiring data;

a transmitter carried on said substrate and in operable connection with said data acquisition means;

controller means carried on said substrate and in operable connection with said transmitter for selectively enabling said transmitter and said data acquisition means at selected times; and

a clock generator carried on said substrate operably connected to said data acquisition means and said transmitter, wherein said clock generator is operably connected to a single oscillation source.

18. The apparatus as recited in claim 17, wherein said clock generator transmits a first frequency to said data acquisition means, transmits a second frequency to said transmitter, and transmits a third frequency to said controller means, wherein said first frequency, said second frequency, and said third frequency are multiples of a selected frequency.

19. The apparatus as recited in claim 18, wherein said first frequency, said second frequency, and said third frequency are rational multiples of the selected frequency.
20. The apparatus as recited in claim 18, further consisting of a single oscillation source for providing the selected frequency.
21. The apparatus as recited in claim 18, wherein said clock generator provides a plurality of oscillation signals, each of said oscillation signals being a selected rational multiple of the oscillation signal from said single oscillation source.
22. The apparatus as recited in claim 17, further comprising data processing means carried on said substrate operably connected between said data acquisition means and said transmitter for conditioning said data.
23. The apparatus as recited in claim 17, further comprising sensor means in electrical communication with said data acquisition means for detecting ambient attributes in proximity to said monolithic substrate.
24. The apparatus as recited in claim 23, wherein said sensor means is selected from the group consisting of a temperature sensor, an optical sensor, a flow sensor, a humidity sensor, a chemical sensor, a biochemical sensor, a current sensor, a voltage sensor, a magnetic field sensor, an electric field sensor, a force sensor, an acceleration sensor, a velocity sensor, a displacement sensor, a position sensor, a vibration sensor, an acoustic sensor, a radiation sensor, a charge sensor, a viscosity sensor, a density sensor, an electrical resistance sensor, an electrical impedance sensor, an electrical capacitance sensor, an electrical inductance sensor and a pressure sensor.

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25. A telemetry apparatus comprising:
  - a monolithic substrate;
  - data acquisition means carried on said substrate for acquiring data;
  - a transmitter carried on said substrate and in operable connection with said data acquisition means;
  - controller means carried on said substrate and in operable connection with said transmitter for selectively enabling said transmitter at selected times;
  - receiver means carried on said substrate and in operable connection with said controller means for receiving signals;
  - a clock generator means carried on said substrate operably connected to said data acquisition means, said transmitter, said receiver means and said controller means.
26. The apparatus as recited in claim 25, wherein said clock generator is connected to a single oscillation source.
27. The apparatus as recited in claim 25, wherein said clock generator transmits a first frequency to said data acquisition means, transmits a second frequency to said transmitter, transmits a third frequency to said controller means and transmits a fourth frequency to said receiver means, wherein said first, second, third and fourth frequencies are rational multiples of a selected frequency.
28. The apparatus as recited in claim 25, further consisting of a single oscillation source for providing the selected frequency.
29. The apparatus as recited in claim 25, further comprising sensor means in electrical communication with said data acquisition means for detecting ambient attributes in proximity to

said monolithic substrate.

30. The apparatus as recited in claim 29, wherein said sensor means is selected from the group consisting of a temperature sensor, an optical sensor, a flow sensor, a humidity sensor, a chemical sensor, a biochemical sensor, a current sensor, a voltage sensor, a magnetic field sensor, an electric field sensor, a force sensor, an acceleration sensor, a velocity sensor, a displacement sensor, a position sensor, a vibration sensor, an acoustic sensor, a radiation sensor, a charge sensor, a viscosity sensor, a density sensor, an electrical resistance sensor, an electrical impedance sensor, an electrical capacitance sensor, an electrical inductance sensor and a pressure sensor.

31. The apparatus as recited in claim 25, further comprising data processing means carried on said substrate operably connected between said data acquisition means and said transmitter for processing said data.

32. The apparatus as recited in claim 25, wherein said controller means selectively enables said data acquisition means at selected times.

33. The apparatus as recited in claim 32, wherein said controller means sequentially enables said data acquisition means and said transmitter.

34. The apparatus as recited in claim 32, further comprising programming means for programming the times that said controller enables said data acquisition means.

35. The apparatus as recited in claim 32, further comprising programming means for programming the times that said controller enables said transmitter.

36. The apparatus as recited in claim 35, wherein said programming means is in operable connection with said receiver means for programming said controller using an signal received by

said receiver means.

37. The apparatus as recited in claim 36, wherein said signal is selected from the group consisting of optical bitstream and RF signal.

38. The apparatus as recited in claim 34, wherein said programming means programs said controller using an optical bitstream.

39. The apparatus as recited in claim 35, wherein said programming means programs said controller using RF communications.

40. The apparatus as recited in claim 25, wherein said controller means selectively enabling said receiver at selected times.

41. The apparatus as recited in claim 25, wherein said controller means selectively enabling said sensor at selected times.

42. The apparatus as recited in claim 25, wherein said transmitter transmits a digital signal.

43. The apparatus as recited in claim 25, wherein said transmitter transmits a spread spectrum signal.

44. The apparatus as recited in claim 25, wherein said transmitter transmits a direct-sequence spread spectrum signal.

45. The apparatus as recited in claim 25, wherein said transmitter transmits a frequency hopping spread spectrum signal.

46. The apparatus as recited in claim 25, wherein said transmitter transmits a time hopping spread spectrum signal.

47. The apparatus as recited in claim 25, wherein said transmitter transmits a

combination of one or more of direct-sequence, frequency hopping, and time-hopping spread spectrum signals.

48. A method for synchronous telemetry comprising:

a clock generator feeding a signal simultaneously to  
a controller means;  
a frequency synthesizer; and  
a spread data generator

said controller means activating in order

at least one sensor  
at least one multiplexer means  
at least one analog to digital converter,  
at least one frequency synthesizer, and  
at least one radio frequency transmitter

wherein each of said sensor, multiplexer, analog to digital converter, said frequency synthesizer and said transmitter are activated in sequence so as to utilize only so much power as is required to process and transmit information from said at least one sensor to a receiver.

49. A method for synchronous telemetry according to claim 48 further comprising means to program said controller means using a signal from a receiver means.

50. A method for synchronous telemetry according to claim 49 wherein said signal is selected from the group consisting of an optical bitstream and an RF signal.

51. A method to regulate power drain in synchronous telemetry apparatus having components comprising:

at least one sensor;  
at least one multiplexer means;  
at least one analog to digital converter;  
at least one synthesizer and  
at least one radio frequency transmitter;  
said means comprising a controller means which activates each component in a programmed order and deactivates each component in a programmed order whereby power is provided only to components needed to perform a specific function.

52. A method for synchronous telemetry comprising:

a clock generator feeding a signal simultaneously to  
a controller means;  
a frequency synthesizer; and  
a spread data generator

said controller means activating in order

at least one sensor  
at least one multiplexer means  
at least one analog to digital converter,  
at least one frequency synthesizer and  
at least one radio frequency transmitter

wherein each of said sensor, multiplexer, analog to digital converter, said frequency synthesizer and said transmitter are activated in sequence so as to minimize the potential for interference from said radio frequency transmitter to other said stages while processing and

transmitting information from said at least one sensor to a receiver.

53. A method for synchronous telemetry according to claim 52 further comprising means to program said controller means using a signal from a receiver means.

54. A method for synchronous telemetry according to claim 53 wherein said signal is selected from the group consisting of an optical bitstream and an RF signal.

55. A method to minimize radio frequency self-interference in synchronous telemetry apparatus having components comprising:

at least one sensor;

at least one multiplexer means;

at least one analog to digital converter;

at least one synthesizer and

at least one radio frequency transmitter means;

said means comprising a controller means which activates each component in a programmed order and deactivates each component in a programmed order whereby power is provided only to components needed to perform a specific function and whereby radio frequency interference from said transmitter means to other components is minimized.

56. A method to minimize radio frequency self-interference in synchronous telemetry apparatus having components comprising:

at least one sensor;

at least one multiplexer means;

at least one analog to digital converter;

at least one synthesizer and

at least one radio frequency transmitter means;  
said means comprising a controller means which activates each component in a programmed order and deactivates each component in a programmed order whereby power is provided only to components needed to perform a specific function and there is no overlap in active operation between said radio frequency transmitter means and any other operation on the apparatus.

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